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EXAMINER	
WHITTINGTON, KENNETH	

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2862	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/781,813	IKEDA ET AL.	
	Examiner	Art Unit	
	KENNETH J. WHITTINGTON	2862	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 August 2008 and 17 June 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *27-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *27-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The Amendment filed August 4, 2008 has been entered and considered. In view thereof, the objections to the Drawings are withdrawn.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 27-29, 32 , 35 and 38

Claims 27-29, 32, 35 and 38 rejected under 35 U.S.C. 103(a) as being unpatentable over Hamaoka et al. (US6483296), hereinafter Hamaoka, in view of White et al. (US5955881), hereinafter White.

Claims 27-29

Regarding claim 27, Hamaoka teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and a outer surface (See Hamaoka FIGS. 22A-22C, note support 11);

at least two magnets positioned to produce a magnetic field across a center of rotation, wherein the magnets each include an inner and outer surface and a first and second end portion, wherein the at least two magnets are made of ferrite- based magnetic materials, further wherein each of the magnets outer surface is attached to the magnet support inner surface and each of the magnets first and second ends are spaced from each other in a circumferential direction by gaps; wherein there is no

magnetic material along an inner peripheral surface of the at least two magnets, and the at least two magnets are not continuous in a circumferential direction (See FIGS. 22A-22C, note magnets 13);

wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See FIGS. 22A-22C, note magnets 13);

wherein each of the magnets has a pair of opposite end. faces; wherein each of the opposite end faces comprises a first surface and a second surface that are respectively inclined relative to an inner circumferential surface and an outer circumferential surface of each of the magnets by obtuse angles (See FIGS. 22A-22C, note magnets 13); and

a magnetoresistive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magnetoresistive sensor rotate relative to each other (See FIGS. 22A-22C note sensors 15 and see col. 17, lines 9-18),

wherein the magnetoresistive sensor outputs signals representing a relative rotational angle (See FIGS 23A, 23B and 24. note sensor output); and

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the sensor is positioned proximal to the second end of the support member (See FIG. 18, note support 32 shown for sensors 31).

However, while Hamaoka teaches the use of magnetoresistive sensors, it does not explicitly teach the particular circuit therefor. White teaches a position sensor using

Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals and calculating a linear angle output (See White col. 4, lines 31-44). It would have been obvious at the time the invention was made to incorporate the magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor of Hamaoka is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

Regarding claim 28, this combination teaches the inner surface is radial (See Hamaoka FIGS. 22A-22C, note support 11).

Regarding claim 29, this combination teaches each of the at least two magnets has an arc-shaped configuration along the radial direction of the magnet support (See Hamaoka FIGS. 22A-22C, note magnets 13).

Claim 32

Regarding claim 32, Hamaoka teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and a outer surface (See Hamaoka FIGS. 22A-22C, note support 11);

at least two magnets positioned to produce a magnetic field across a center of rotation, wherein the magnets each include an inner and outer surface and a first and

second end portion, wherein the at least two magnets are made of ferrite- based magnetic materials, further wherein each of the magnets outer surface is attached to the magnet support inner surface and each of the magnets first and second ends are spaced from each other a circumferential direction by gaps; wherein there is no magnetic material along an inner peripheral surface of the at least two magnets, and the at least two magnets are not continuous in a circumferential direction; wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See FIGS. 22A-22C, note magnets 13); and

a magnetoresistive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magnetoresistive sensor rotate relative to each other, and wherein the magnetoresistive sensor outputs signals representing a relative rotational angle (See FIGS. 22A-22C note sensors 15 and see col. 17, lines 9-18 and see FIGS. 23A, 23B and 24), and

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the IC is positioned proximal to the second end of the support member (See FIG. 18, note support 32 shown for sensors 31).

However, while Hamaoka teaches the use of magnetoresistive sensors, it does not explicitly teach the particular circuit therefor. White teaches a position sensor using Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals and calculating a linear

angle output (See White col. 4, lines 31-44). It would have been obvious at the time the invention was made to incorporate the magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor of Hamaoka is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

Claim 35

Regarding claim 35, this combination teaches a rotational angle sensor comprising a pair of arc shape magnets wherein each of the magnets has a pair of opposite end faces along a circumferential direction; wherein each of the opposite end faces comprises a first surface and a second surface that are respectively substantially aligned with a direction of the magnetic field and substantially aligned perpendicular to the direction of the magnetic field (See Hamaoka FIGS. 21A-21C, note magnets 145 and 146).

Claim 38

Regarding claim 38, Hamaoka teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and a outer surface (See Hamaoka FIGS. 22A-22C, note support 11);

at least two magnets positioned to produce a magnetic field across a center of rotation, wherein the at least two magnets are made of ferrite-based magnetic material,

further wherein each of the magnets is attached to the magnet support inner surface, wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See FIGS. 22A-22C, note magnets 13); and

a magnetoresistive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magnetoresistive sensor rotate relative to each other, wherein the magnetoresistive sensor outputs signals representing a relative rotational angle (See FIGS. 22A-22C note sensors 15 and see col. 17, lines 9-18 and see FIGS. 23A, 23B and 24); and

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the IC is positioned proximal to the second end of the support member (See FIG. 18, note support 32 shown for sensors 31).

However, while Hamaoka teaches the use of magnetoresistive sensors, it does not explicitly teach the particular circuit therefor. White teaches a position sensor using Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals and calculating a linear angle output (See White col. 4, lines 31-44). It would have been obvious at the time the invention was made to incorporate the magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor of Hamaoka is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control

unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

Claims 30 and 31

Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (US5544000), hereinafter Suzuki, in view of Hamaoka and Lamb et al. (US6806702), hereinafter Lamb and White.

Claim 30

Regarding claim 30, Suzuki teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and an outer surface (See Suzuki FIGS. 1-3, 9, 13 and 14, item 4);

at least two magnets attached to the inner surface of the magnet support, so that the magnets produce a magnetic field across a center of rotation, wherein the magnets are made of ferrite-based magnetic materials and have opposite end portions in a circumferential direction about the center of rotation, and wherein the magnets are spaced from each other in the circumferential direction by gaps, wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See Suzuki FIGS. 1-3, 9, 13 and 14, items 2a and 2b);

a magneto-sensitive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magneto-sensitive sensor rotate relative to each other, wherein the magneto-sensitive

sensor comprises a circuit having a magneto-sensitive element, wherein the magneto-sensitive sensor outputs signals representing a relative rotational angle wherein the magneto-sensitive sensor comprises a self-contained control unit for receiving the output signals and calculating a linear angle output (See Suzuki FIGS. 1-7, 9 and 11-14, sensors 8a and 8b on integrated circuit 27 having signal processing control and components shown as integrated circuit in FIGS. 5-7 with specific components shown in FIG. 11, outputting a signal that is generally linear as shown in FIG. 12); and

wherein there is no magnetic material between an inner peripheral surface of the at least two opposing magnets and around the magneto-sensitive sensor, and between the opposite end portions (See Suzuki FIGS. 1-3, 9, 13 and 14, note lack of magnetic material between magnets 2a and 2b and around sensors 8a and 8b),

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the sensor assembly is positioned proximal to the second end of the support member (See Suzuki FIG. 1, note packing portion 34 of housing having a stationary support for the circuit board).

However, Suzuki does not teach the recited edge portions or the use of magneto-resistive sensors or an integrated circuit as contemplated by Applicants. Hamaoka teaches a rotational angle sensor comprising a pair of arc shape magnets wherein each of the magnets has a pair of opposite end faces; wherein each of the opposite end faces comprises a first surface and a second surface that are respectively inclined relative to an inner circumferential surface and an outer circumferential surface of each

of the magnets by obtuse angles and are provided with a magnetization that runs parallel between the magnets (See Hamaoka FIGS. 21A-21C, note magnets 145 and 146). It would have been obvious at the time the invention was made to incorporate the end portions of the magnets and the magnetization as taught by Hamaoka in the apparatus of Suzuki. One having ordinary skill in the art would do so to increase the range of the rotational sensor (See Hamaoka col. 15, line 32 to col. 6, line 57).

This combination also does not explicitly teach the use of the magnetoresistive sensors which are incorporated into an integrated circuit. Lamb teaches a rotary position sensor comprising sensors mounted between magnets (See Lamb FIGS. 1-3, note sensor 102 or 302 between magnets 106 and 108), wherein the sensor is a magnetoresistive sensor comprising an integrated circuit and a magnetoresistive element (See Lamb col. 2, lines 41-52 and see FIG. 4 and disclosure related thereto). It would have been obvious at the time the invention was made to use a magnetoresistive sensors incorporated into an IC in the apparatus of Suzuki in view of Hamaoka in lieu of the Hall sensors thereof. One having ordinary skill in the art would do so because as noted in Lamb, either sensor incorporated into an IC can be used to measure the angle of a magnetic field in the rotary position sensor (See Lamb col. 2, lines 41-52).

This combination also does not explicitly teach the control unit mounted on the IC in the magnetoresistive sensor. White teaches a position sensor using Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals (See White col. 4, lines 31-44). It

would have been obvious at the time the invention was made to incorporate the magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor of Hamaoka is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

<u>Claim 31</u>

Regarding claim 31, Suzuki teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and an outer surface (See Suzuki FIGS. 1-3, 9, 13 and 14, item 4);

a first and second magnet attached to the inner surface of the magnet support to produce a magnetic field across a center of rotation, wherein the first and second magnet are made of ferrite-based magnetic materials and have opposing end portions in a circumferential direction about the center of rotation, and wherein the opposing end portions of the first and second magnets are spaced from each other in the circumferential direction by gaps, wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See Suzuki FIGS. 1-3, 9, 13 and 14, items 2a and 2b);

a magneto-sensitive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magneto-sensitive sensor rotate relative to each other, wherein the magneto-sensitive

sensor comprises a circuit having a magneto-sensitive element, wherein the magneto-sensitive sensor outputs signals representing a relative rotational angle wherein the magneto-sensitive sensor comprises a self-contained control unit for receiving the output signals and calculating a linear angle output (See Suzuki FIGS. 1-7, 9 and 11-14, sensors 8a and 8b on integrated circuit 27 having signal processing control and components shown as integrated circuit in FIGS. 5-7 with specific components shown in FIG. 11, outputting a signal that is generally linear as shown in FIG. 12); and

wherein there is no magnetic material around the sensor and within at least one of the gaps (See Suzuki FIGS. 1-3, 9, 13 and 14, note lack of magnetic material between magnets 2a and 2b and around sensors 8a and 8b),

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the sensor assembly is positioned proximal to the second end of the support member (See Suzuki FIG. 1, note packing portion 34 of housing having a stationary support for the circuit board).

However, Suzuki does not explicitly teach the recited edge portions or the use of magneto-resistive sensors or an integrated circuit as contemplated by Applicants. Hamaoka teaches a rotational angle sensor comprising a pair of arc shape magnets wherein each of the magnets has a pair of opposite end faces; wherein each of the opposite end faces comprises a first surface and a second surface that are respectively inclined relative to an inner circumferential surface and an outer circumferential surface of each of the magnets by obtuse angles and are provided with a magnetization that

runs parallel between the magnets (See Hamaoka FIGS. 21A-21C, note magnets 145 and 146). It would have been obvious at the time the invention was made to incorporate the end portions of the magnets and the magnetization as taught by Hamaoka in the apparatus of Suzuki. One having ordinary skill in the art would do so to increase the range of the rotational sensor (See Hamaoka col. 15, line 32 to col. 6, line 57).

This combination also does not explicitly teach the use of the magnetoresistive sensors which are incorporated into an integrated circuit. Lamb teaches a rotary position sensor comprising sensors mounted between magnets (See Lamb FIGS. 1-3, note sensor 102 or 302 between magnets 106 and 108), wherein the sensor is a magnetoresistive sensor comprising an integrated circuit and a magnetoresistive element (See Lamb col. 2, lines 41-52 and see FIG. 4 and disclosure related thereto). It would have been obvious at the time the invention was made to use a magnetoresistive sensors incorporated into an IC in the apparatus of Suzuki in view of Hamaoka in lieu of the Hall sensors thereof. One having ordinary skill in the art would do so because as noted in Lamb, either sensor incorporated into an IC can be used to measure the angle of a magnetic field in the rotary position sensor (See Lamb col. 2, lines 41-52).

This combination also does not explicitly teach the control unit mounted on the IC in the magnetoresistive sensor. White teaches a position sensor using Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals (See White col. 4, lines 31-44). It

would have been obvious at the time the invention was made to incorporate the magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor of Hamaoka is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

Claims 33 and 34

Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. (US5544000), hereinafter Suzuki, in view Lamb and White.

Claim 33

Regarding claim 33, Suzuki teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and an outer surface (See Suzuki FIGS. 1-3, 9, 13 and 14, item 4);

at least two magnets attached to the inner surface of the magnet support, so that the magnets produce a magnetic field across a center of rotation, wherein the magnets are made of ferrite-based magnetic materials and have opposite end portions in a circumferential direction about the center of rotation, and wherein the magnets are spaced from each other in the circumferential direction by gaps; wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See Suzuki FIGS. 1-3, 9, 13 and 14, items 2a and 2b);

a magneto-sensitive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magnetoresistive sensor rotate relative to each other, wherein the magneto-sensitive sensor comprises an circuit having a magneto-sensitive element; wherein the magneto-sensitive sensor outputs signals representing a relative rotational angle, and wherein the magneto-sensitive sensor comprises a self-contained control unit for receiving the output signals and calculating a linear angle output (See Suzuki FIGS. 1-7, 9 and 11-14, sensors 8a and 8b on integrated circuit 27 having signal processing control and components shown as integrated circuit in FIGS. 5-7 with specific components shown in FIG. 11, outputting a signal that is generally linear as shown in FIG. 12), and

wherein there is no magnetic material between an inner peripheral surface of the at least two opposing magnets and around the magnetoresistive sensor, and between the opposite end portions (See Suzuki FIGS. 1-3, 9, 13 and 14, note no magnetic material between items 2a and 2b and around sensors 8a and 8b),

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the sensor assembly is positioned proximal to the second end of the support member (See Suzuki FIG. 1, note packing portion 34 of housing having a stationary support for the circuit board).

However, Suzuki does not explicitly teach using magneto-resistive sensors as the magneto-sensitive elements or incorporation into an integrated circuit. Lamb teaches a rotary position sensor comprising sensors mounted between magnets (See

Lamb FIGS. 1-3, note sensor 102 or 302 between magnets 106 and 108), wherein the sensor is a magnetoresistive sensor comprising an integrated circuit and a magnetoresistive element (See Lamb col. 2, lines 41-52 and see FIG. 4 and disclosure related thereto). It would have been obvious at the time the invention was made to use a magnetoresistive sensors incorporated into an IC in the apparatus of Suzuki in lieu of the Hall sensors thereof. One having ordinary skill in the art would do so because as noted in Lamb, either sensor incorporated into an IC can be used to measure the angle of a magnetic field in the rotary position sensor (See Lamb col. 2, lines 41-52).

This combination also does not explicitly teach the control unit mounted on the IC in the magnetoresistive sensor. White teaches a position sensor using Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals (See White col. 4, lines 31-44). It would have been obvious at the time the invention was made to incorporate the magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

<u>Claim 34</u>

Regarding claim 34, Suzuki teaches a rotational angle detecting device comprising:

a magnet support having an inner surface and an outer surface (See Suzuki FIGS. 1-3, 9, 13 and 14, item 4);

a first and second magnet attached to the inner surface of the magnet support to produce a magnetic field across a center of rotation, wherein the first and second magnet each have a pair of opposing end portions, wherein the first and second magnets are made of ferrite-based magnetic materials, the opposing end portions of the first magnet being separated from the opposing end portions of the second magnet by gaps; wherein each of the magnets has an arc-shaped configuration along a circumferential direction (See Suzuki FIGS. 1-3, 9, 13 and 14, items 2a and 2b);

a magneto-sensitive sensor disposed within the magnetic field and arranged and constructed to detect a change of direction of the magnetic field as the magnets and magnetoresistive sensor rotate relative to each other, wherein the magneto-sensitive sensor comprises an circuit having a magneto-sensitive element; wherein the magneto-sensitive sensor outputs signals representing a relative rotational angle, and wherein the magneto-sensitive sensor comprises a self- contained control unit for receiving the output signals and calculating a linear angle output (See Suzuki FIGS. 1-7, 9 and 11-14, sensors 8a and 8b on integrated circuit 27 having signal processing control and components shown as integrated circuit in FIGS. 5-7 with specific components shown in FIG. 11, outputting a signal that is generally linear as shown in FIG. 12), and

wherein there is no magnetic material around the sensor and within at least one of the gaps (See Suzuki FIGS. 1-3, 9, 13 and 14, note lack of material between magnets 2a and 2b and around sensors 8a and 8b),

wherein the detecting device includes a stationary support member having a first end and a second end; wherein the first end is fixed in position; wherein the second end is configured as a free end; and wherein the sensor assembly is positioned proximal to the second end of the support member (See Suzuki FIG. 1, note packing portion 34 of housing having a stationary support for the circuit board).

However, Suzuki does not explicitly teach using magneto-resistive sensors as the magneto-sensitive elements or incorporation into an integrated circuit. Lamb teaches a rotary position sensor comprising sensors mounted between magnets (See Lamb FIGS. 1-3, note sensor 102 or 302 between magnets 106 and 108), wherein the sensor is a magnetoresistive sensor comprising an integrated circuit and a magnetoresistive element (See Lamb col. 2, lines 41-52 and see FIG. 4 and disclosure related thereto). It would have been obvious at the time the invention was made to use a magnetoresistive sensors incorporated into an IC in the apparatus of Suzuki in lieu of the Hall sensors thereof. One having ordinary skill in the art would do so because as noted in Lamb, either sensor incorporated into an IC can be used to measure the angle of a magnetic field in the rotary position sensor (See Lamb col. 2, lines 41-52).

This combination also does not explicitly teach the control unit mounted on the IC in the magnetoresistive sensor. White teaches a position sensor using Hall or magnetoresistive sensors wherein the magnetoresistive sensor comprises an IC having a magnetoresistive element and wherein the magnetoresistive sensor comprises a self-contained control unit for receiving the output signals (See White col. 4, lines 31-44). It would have been obvious at the time the invention was made to incorporate the

magnetoresistive sensors into an integrated circuit, such that the magnetoresistive sensor is incorporated into an integrated circuit along with some means of control. One having ordinary skill in the art would do so to provide a support for the magnetoresistive sensor and provide a control unit for biasing the sensor and receiving signals therefrom (See White col. 4, lines 31-44).

Claims 36 and 37

Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Lamb and White as applied to claims 33 and 34 above, and further in view of Hamaoka.

Regarding claims 36 and 37, Suzuki in view of Lamb and White teaches the features of claims 33 and 34 as discussed above, but not explicitly the recited edge portions thereof. Hamaoka teaches a rotational angle sensor comprising a pair of arc shape magnets wherein each of the magnets has a pair of opposite end faces along a circumferential direction; wherein each of the opposite end faces comprises a first surface and a second surface that are respectively substantially aligned with a direction of the magnetic field and substantially aligned perpendicular to the direction of the magnetic field (See Hamaoka FIGS. 21A-21C, note magnets 145 and 146). It would have been obvious at the time the invention was made to incorporate the end portions of the magnets and the magnetization as taught by Hamaoka in the apparatus of Suzuki in view of Lamb and White. One having ordinary skill in the art would do so to increase the range of the rotational sensor (See Hamaoka col. 15, line 32 to col. 6, line 57).

Response to Arguments

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KENNETH J. WHITTINGTON whose telephone number is (571)272-2264. The examiner can normally be reached on Monday-Friday, 7:30am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Assouad can be reached on (571) 272-2210. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Kenneth J Whittington/
Primary Examiner, Art Unit 2862